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Maize seed bed Temperatures

J. Cochrane

10 cm maximum/minimum soil thermometers were installed in maize plots at NIRD, Shinfield to examine the effectson soil temperatures of pre-drilling application of slurry and post-drilling application of bitumen mulch. Slurry was applied at rates of 35, 70 and 105 metric tons per hectare; the bitumen was sprayed on by hand to a nominal thickness of 1 to 2 mm and a width of 20 to 25 cm.

Over the period April 27th to June 19th, the average temperature gain due to each treatment was:-

	Slurry at			Bitumen Mulch
	35	70	105	
Maximum °C	0.3	0.6	0.5	2.8
Minimum °C	0.5	0.3	0.5	0.8

Although the slurry application gives a slight advantage in both maximum and minimum temperatures, the differences between the three levels of application are not significant.

The outstanding gain is obviously in maximum temperature under the bitumen mulch. This advantage was never less than 0.4°C and was greater that 4°C on a number of days with a maximum advantage of 4.3°C. As would be expected the temperature advantage depends largely on sunshine amounts and the correlation between the maximum temperature gain under the bitumen and daily sunshine amounts is 0.62. However, a correlation of - 0.59 on rainfall shows the effect of soil moisture content. When the relationship between rainfall and sunshine is removed the partial correlations on rainfall and sunshine are respectively -0.45 and 0.49.

Accumulated temperature sums above 10°C (from sowing date) are shown in the following table for the control, mulched and (mean of three) slurry treatment plots.

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Accumulated temperature above 10°C in day-degrees

Date	Control	Slurry	Bitumen Mulch
April 30	3	4	8
May 5	4	5	11
10	10	13	26
15	27	32	51
20	61	67	92
25	82	91	122
30	116	129	167
June 5	162	178	225
10	185	204	257
15	229	247	313
19	265	285	356

The slurry plots were drilled on April 18th, the others on April 25th. However, temperatures between April 18th and 25th were not high enough to affect the comparison of accumulated temperatures.
First emergence dates were May 11th for mulched plots, May 15th for control and May 16th for the slurry treatments. Full emergence was at May 14th, 20th and 22nd respectively. The accumulation from sowing to first emergence is reasonably consistent at about 30 day-degrees but is much more variable on the interval to full emergence. It is apparent that the bitumen mulch results in an advantage of about 5 days within some 10 days of sowing and that this advantage is increased to about 10 days after 5 to 6 weeks. Nevertheless, the advance of emergence of 4 days consequent on an increase in mean temperatures (at 10 cm depth) of about 1.5°C compares favourably with the estimate of a 1 week gain per degree C rise in temperatures at 5 cm depth (Spoor and Giles, 1973).

Although direct statistical comparisons are not possible, germination was apparently earlier and more even and emergence rate was higher in the mulched plots than in the unmulched.

Any comments or suggestions on this paper should be sent to the author.

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HQ Met Office
Bracknell
Berks

Reference

Spoor, G and Giles, F.H., Effect of cultivations on raising spring soil temperatures for germination with particular reference to maize. J. Soil Sc., Vol 24, No. 3, 1973.